

**ARE THERE LESSONS IN US MARINE CORPS  
GROUND MAINTENANCE OPERATIONS  
FOR A FORCE PROJECTION ARMY?**

**A Monograph  
by  
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## **ABSTRACT**

**ARE THERE LESSONS IN MARINE CORPS GROUND MAINTENANCE OPERATIONS FOR A FORCE PROJECTION ARMY?** by MAJ Tyler C. Osenbaugh, 51 pages.

The Army is embarking on a transformation plan that will allow ground units to rapidly deploy from CONUS to an undeveloped theater of operation and conduct sustained combat operations. In order to accomplish this feat there will be a complete transformation in force structure. The transformed Army (or Objective Force) is not expected to be operational until some time after 2012. Until that time the legacy force complemented by the Interim Brigade Combat Team will be the Army's contribution for fighting and winning the nations wars. In order to project and sustain these heavier forces refinements to current sustainment doctrine is necessary. According to FM 3-0 operational reach is influenced by combat power, sustainment capabilities as well as the geography. An effective ground maintenance program can increase the operational reach of ground forces.

The purpose of this monograph is to determine if the Marine Corps ground maintenance operations offer any insight for improving maintenance operations for a force projection Army. The Marine Corps has extensive experience as a CONUS based projection force. They utilize many of the same ground systems that the Army employs, receiving support from the same depots. The two services share a maneuver oriented, offensive doctrine. Despite the many similarities the Marine Corps' focus on expeditionary operations has lead to some differences in maintenance operations. These differences will be analyzed in the areas of doctrine, training, organization, pre-positioning strategies, class IX management, and developing concepts for future operations.

It will be shown that the Marine Corps expeditionary focus has led to several valid concepts for incorporation into a force projection Army. The author determines that the Marine Corps' concepts in the areas of doctrine, pre-positioning and developing concepts better support a CONUS based projection force. The conclusions drawn by the author are focused on improving the operational reach of Army ground forces in order to provide the Combatant Commander the flexibility required to achieve national objectives.

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# CHAPTER 1

## INTRODUCTION

Attaining enhanced strategic responsiveness requires transforming our logistics concepts, organizations, technology and, most importantly, our mindset. The Army's transformation of its logistical support will allow it to provide the Joint Force with equal or greater logistical support even while substantially reducing its footprint.<sup>1</sup>

Erik K. Shinseki and Thomas E. White, *The Army Transformation Roadmap*

General Shinseki and Secretary White's vision is to transform the Army into a rapidly deployable force capable of quickly concentrating combat power in an operational area.<sup>2</sup> The current force structure is capable of accomplishing the goal, but only if it is forward deployed with a robust, developed infrastructure. Since the end of World War II the United States maintained a large force in the expected theater of operations to meet the challenge. These facts led to the development of the "big five," very resource intensive equipment that emphasized lethality and survivability over sustainability. The current doctrine to sustain the force equipped with the big five requires a large, relatively secure theater infrastructure. As the Army increasingly becomes a continental US-based power projection force, it requires logisticians to operate in an ad hoc fashion to sustain operations. The Army can no longer afford to rely on a structure that is designed to operate from an established robust infrastructure or that requires the development of one prior to commitment. Future operations will likely be mounted and sustained directly from the US or the territory of a regional ally choosing to support the US, creating minimal essential theater support facilities.<sup>3</sup> Taking into account these realities, the Army must

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<sup>1</sup>Erik K. Shinseki and Thomas E. White, *The Army Transformation Roadmap* (Washington, DC: Department of the Army, not dated), 7 [document on-line]; available from [http://www.army.mil/vision/Transformation\\_Roadmap.pdf](http://www.army.mil/vision/Transformation_Roadmap.pdf); Internet; accessed on 18 October 2002.

<sup>2</sup>Erik K. Shinseki, *US Army White Papers Concept for the Objective Force* (Washington DC: Not dated), 9.

<sup>3</sup>Huba Wass de Czege and Richard Hart Sinnreich, "Conceptual Foundations of a Transformed U.S. Army," *Land Warfare Papers* No. 40 (March 2002): 7.

develop the traits required to sustain an expeditionary force and therefore should be able to capitalize on the Marine Corps experience and efforts in this arena.

The transformation to the Objective Force is expected to reduce sustainment requirements but it is clear that the current weapons systems will be employed at least through 2012.<sup>4</sup> The sustainability of the Objective Force is at the forefront of the development. The reliability of objective force equipment is projected to far exceed the current weapon systems. The logistics force structure and the way that is to be employed is all under revision in order to fulfill the Chief of Staff's vision. In order to bridge the gap between full conversion to the Objective Force it is necessary to examine all aspects of the Army's current combat service support systems for improvements. Marine Corps ground maintenance doctrine, operating procedures, and innovations being pursued as they develop their "expeditionary logistics over the sea" hold valuable lessons for Army doctrine as it transforms to the Objective Force. Additionally, concepts being developed for sustainment of future forces may be able to be applied to more effectively support the Legacy Force.

### ***Historical Perspective***

The great lesson of the operational art for Desert Storm has nothing to do with the metaphysics of selecting "centers of gravity"--so popular a concept with graduates of the School of Advanced Military Studies--nor with the insight that it was better for ground forces to go around than through the Iraqi array, which was obvious (although, in the event, the Air Force may have rendered the distinction moot). Rather, it is in the extent to which logistics dominates the operational offensive.<sup>5</sup>

The industrialization of war has increased the complexity and importance of military logistics and more specifically maintenance. Martin Van Creveld in *Command in War* emphasizes the importance of logistics on the modern battlefield in his statement, "Without a firm

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<sup>4</sup>Erik K. Shinseki, Chief of Staff of the Army Remarks at the Dwight D. Eisenhower Luncheon, 22 October 2002, Association of the United States Army, Washington DC.

<sup>5</sup>Richard M. Swain, *Lucky War, Third Army in Desert Storm* (Washington, DC, U.S. Army Center of Military History, 1997), 332.

directing hand providing for the uninterrupted flow of supplies, replacements, and reinforcements a machine-age army will cease to function within a matter of days in the same way as an automobile factory deprived of its supply of parts.”<sup>6</sup> More specific to maintenance he writes, “The lack of a spare part can turn a machine gun from a death-dealing contrivance of unrivaled excellence into a mere unwieldy encumbrance.”<sup>7</sup> The German Army’s performance during its invasion of Russia provides a perfect example of the impact of not grasping these concepts.

The German Army demonstrated both the power and the problems involved in mechanized warfare as they attacked into Russia during Operation Barbarossa in 1941. Inadequate maintenance planning caused the Army Group Center to lose a significant portion of its combat power and contributed to their inability to accomplish its objective of capturing Moscow. Having started the campaign with 1,780 battle tanks in Army Group Center, the German Army still had approximately 1,157 tanks running and 356 in repairs.<sup>8</sup> Its losses due to maintenance were significantly higher than the catastrophic losses due to battle. Germany’s rapid buildup of mechanized forces prior to the initiation of Operation Barbarossa led Germany’s industry to produce new tanks, rather than devoting any production towards repair parts.<sup>9</sup> If the German Army had been able to effect repairs of just three-quarters of the repairable tanks, they would have increased their operational readiness rate from 65 percent to 80 percent. The additional combat power may have allowed them to continue and capture Moscow. In today’s parlance, the German Army’s inadequate plan for sustaining its combat power reduced its

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<sup>6</sup>Martin Van Creveld, *Command in War* (Cambridge: Harvard College, 1985), 185.

<sup>7</sup>Ibid.

<sup>8</sup>Russel H. S. Stolfi, *Hitler’s Panzers East* (Norman, OK: University of Oklahoma Press, 1993), 162.

<sup>9</sup>Martin Van Creveld, *Supplying War: Logistics from Wallenstein to Patton* (New York: Cambridge University Press, 1979), 151. The German army went from 9 armoured divisions to 19, and from a total of 120 divisions of all kinds to 180, later revised to 207. Spare parts for existing formations were almost impossible to obtain.

operational reach<sup>10</sup> and caused it to culminate prior to securing Moscow. The result was a slowing of the operational tempo, which allowed the Soviet Forces time to regain their balance and organize their defense to eventually defeat the German Army. Operational reach is influenced by combat power, sustainment capabilities, and the geography,<sup>11</sup> and in the German Army's case all of these factors contributed to their failure.

During Operation Desert Storm the United States demonstrated the ability to sustain high operational readiness rates on ground combat systems. The Government Accounting Office reported readiness rates of 90 and 91 percent on M1A1s, M2s, and M3s after four days of fighting.<sup>12</sup> This was only possible after a long period of developing the rear area to support the operation. It would not have been possible without the assistance of Saudi Arabia and with its fully developed infrastructure. The Saudi airports and seaports are modern, sophisticated, and complex, rivaling those of Europe and the Pacific in terms of capacity and capability.<sup>13</sup> As a host nation, Saudi Arabia provided supplies, such as food, water, and fuel, freeing U.S. strategic lift assets to focus on the deployment of troops and sustainment stocks. Even with these advantages, the Central Command (CENTCOM) logistics structure did not mature until mid-November and would not have supported the scale of offensive operations that were eventually conducted.<sup>14</sup> The high operational readiness rates were attained because units took advantage of the time to conduct thorough maintenance and underwent a significant amount of modernization prior to conducting

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<sup>10</sup>Chairman of the Joint Chiefs of Staff, Joint Publication 3-0, *Doctrine for Joint Operations* (Washington DC: Department of Defense, 10 September 2001), GL-15. Operational reach is the distance and duration across which a unit can successfully employ military capabilities.

<sup>11</sup>Department of the Army, FM 3-0, *Operations* (Washington, DC: Headquarters Department of the Army, 14 June 2001), 5-10.

<sup>12</sup>GAO Report to the Chairman, Subcommittee on Oversight of Government Management, Committee on Governmental affairs, U.S. Senate, DESERT SHEILD/STORM LOGISTICS. November 1991. p. 21

<sup>13</sup>Department of Defense, *Conduct of the Gulf War: Final Report to Congress* (Washington, DC: Government Printing Office, 1992), 295

<sup>14</sup>*Ibid.*, 78.



the ground offensive.<sup>15</sup> It is unlikely that the readiness rates would have been as high without these additional steps. The Objective Force seeks to eliminate the need for this systematic buildup that is susceptible to enemy antiaccess strategies. Techniques for sustaining the Army's current systems without fully developing a large theater infrastructure must be pursued in order to be more responsive to the Regional Combatant Commanders.

The essence of a campaign plan is to accomplish the assigned national strategic objectives, with logistics providing the extension of the commander in chief's (CINC's) strategic and operational reach into the theater.<sup>16</sup> As part of Title 10, "We [the Army] also have the responsibility to provide other Joint Force elements with responsive logistical support."<sup>17</sup> Improvements in maintenance doctrine that contribute to the reduction of the logistical footprint in theater while maintaining operational readiness have the potential to increase the operational reach of ground forces. Increasing the operational reach will ensure that the combatant commanders are able to rapidly respond and decisively defeat future enemies regardless of the theater of employment.

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<sup>15</sup> Ibid., 128.

<sup>16</sup> Chairman of the Joint Chiefs of Staff, JP 4-0, *Doctrine for Logistics Support of Joint Operations* (Washington, DC: Department of Defense, 6 April 2000), IV-6.

<sup>17</sup> Erik K. Shinseki, *Army Transformation Roadmap* (Washington, DC: U.S. Department of the Army, not dated) P B2.

## CHAPTER 2

### COMPARISON

As ground forces the Marine Corps and the Army sustainment operations have similar missions and are conducted in a somewhat similar fashion. In fact the two forces utilize many of the same combat systems, a trend that is likely to increase with the emphasis on joint acquisition after the 1986 Defense Reorganization Act.<sup>18</sup> The expeditionary nature of the Marine Corps greatly influences its doctrinal approach to logistics and combat service support. A logistical system that enables some 45,000 personnel to deploy and be self-sustaining for sixty days holds promise for a force projection Army. Within sixty days it is likely that strategic lift assets would be poised to continue the support the Army and allow it to meet its mission of conducting sustained combat operations. The Marine Corps and Army differ in their doctrine, organization, training, and within their pre-positioning methodology. All of these areas influence the effectiveness of maintenance operations and the ability to sustain the combat power of forces in the field.

### Doctrine

Logistics becomes, in fact, the very core of generalship . . . to get military forces into a theater of war in superior strength and husband that strength until they shall prevail.<sup>19</sup>

Marine Corps doctrinal publications (MCDPs) provide “the fundamental and enduring beliefs of war fighting and the guiding doctrine for the conduct of major war fighting activities.”<sup>20</sup> Marine Corps war-fighting publications (MCWPs) “have a narrower focus detailing tactics,

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<sup>18</sup> James R. McKenzie, *Who is Responsible For The Joint Acquisition Mess* (Washington DC: The Industrial College of the Armed Forces, 1993. p. 18 The author believes that the Defense Reorganization Act or 1986 will provide the catalyst for joint acquisition.

<sup>19</sup>S. L. A. Marshall, *The Soldiers Load and the Mobility of a Nation* (Quantico, VA: The Marine Corps Association, 1980), 4.

<sup>20</sup> Marine Corps Doctrine Division, Web page; available from <https://www.dctrine.usmc.mil/htm/doc3.htm>; Internet; accessed on November 6, 2002

techniques, and procedures (TTPs) used by the Marine Corps in the prosecution of war and other assigned tasks.’<sup>21</sup> The logistics doctrine of the Marine Corps is a fully developed through this systematic approach to doctrine. MCDP 4, *Logistics*, provides the philosophic foundation for all aspects of logistics. It addresses the subject as a complex system of systems with all functions being interrelated and therefore unwise to plan any aspect in isolation. MCDP 4 is reinforced and expanded upon in MCWP 4, *Logistics Operations*, which provides the information needed to understand and conduct logistical planning and logistical operations in a joint environment. Each echelon of war is then discussions in more detail in MCWP 4-11, *Tactical Logistics*, MCWP 4-12, *Operational Level Logistics*, and a yet to be published MCWP 4-13, *Strategic Level Logistics*. Maintenance operations are covered in each of these publications along with how it is integrated in the logistics and combat services support operations at that level. The details of maintenance doctrine are then further expanded in MCWP 4-24, *Maintenance Operations* (this is to be re-numbered to 4-11.4 in the future). This philosophical, holistic approach is absent in Army logistics doctrine, which is generally confined to describing logistical functions by echelon. Perhaps the writing of FM 4.0 will provide the needed overarching philosophy for logistics that is found in MCDP 4 and MCWP 4. In order to adequately compare the Marine Corps maintenance operations to those of the Army, it is necessary to understand the overall philosophy and concepts presented in the Marine Corps logistical regulations.

### **MCDP 4, *Logistics***

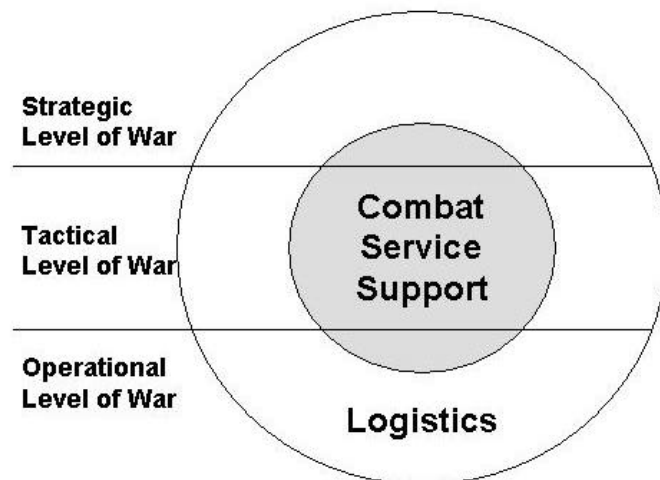
The first chapter, “The Nature of Logistics,” begins with a definition of logistics (the means which translates national resources into combat power).<sup>22</sup> The Marine Corps makes a clear distinction between logistics and combat service support (the activity which actually provides

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<sup>21</sup> Ibid.

<sup>22</sup> Commandant of the Marine Corps, MCDP 4, *Logistics* (Washington, DC: Government Printing Office, February 1997), 4.

services and supplies to combat forces). Though this may sound as if combat service support were strictly a tactical function and that logistics only occurred at levels above tactical, it is clear that both functions occur at each echelon of war. This theme of precise language is common throughout the doctrine. This distinction is not drawn in Army doctrine though all of the same functions are discussed in chapter 12 of FM 3-0. The Marine Corps uses numerous conceptual models throughout its regulations to lend clarity to the topic. The model it presents for logistics and combat service support demonstrates that both activities occur at the strategic, operational, and tactical levels of war in varying degrees (figure 1).



**Figure 1. Logistics and Combat Service Support**

The chapter continues emphasizing that logistics is a complex system that must respond to a constantly changing, evolving, military force structure, while responding to the dynamic environment in which it is to be performed. This makes a convincing case for flexibility. The need for flexibility is reinforced as it describes logistics as an art and science, warning of the

dangers of trying to impose order by stubbornly enforcing procedures even as the tactical situation changes. The logistical artist must possess the technical skills required to translate time and distance to resources required as well as the creativity to anticipate future requirements. Since war is essentially a contest between opposing wills, the moral domain is the preeminent factor. The Marine Corps acknowledges the importance of the human dimension and the important role logistics plays in maintaining soldier motivation. Effective logistics free the forces from their preoccupation with their needs allowing them to focus their efforts on mission accomplishment. The chapter concludes by making the point that “logistics sets the outward limit on what is operationally possible”<sup>23</sup> and that logisticians must strive to extend these limits to encompass the needs of the regional combatant commander. Striving to improve the operational reach of the ground forces is essential for future conflicts.

The second chapter, “Logistics Theory,” provides the framework that the Marine Corps uses to cover both logistics and combat service support. The complete process consists of the acquisition, distribution, sustainment, and final disposition of supplies and material. It is unique in that it addresses the need for fiscal and environmental responsibility in its definition of disposition. The chapter also provides a concise listing of the types of logistical functions performed at the strategic, operational, and tactical levels of war (figure 2). This is not meant to be a comprehensive list, but does provide the major activities that occur at the different levels of war.

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<sup>23</sup>Ibid., 30.

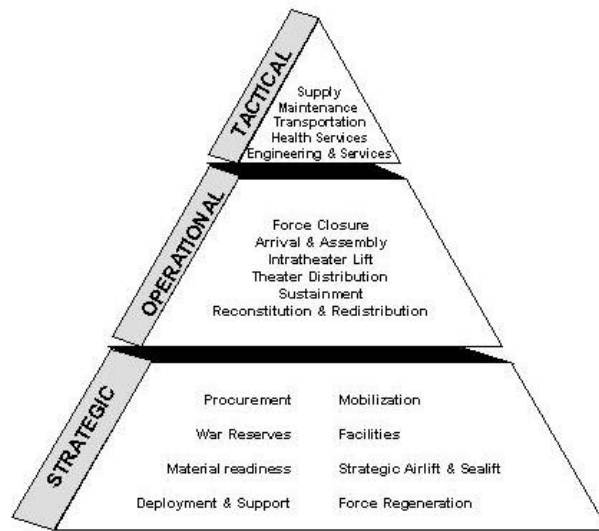


Figure 2. Levels of Logistics

The chapter continues with a discussion of the evolution of logistical operations with industrialization transforming logistics “from an important aspect of warfare to an essential prerequisite for the conduct of war.”<sup>24</sup> Several trends are then identified that are as applicable to the Army as the Marine Corps. They are: (1) the expanding battle space (very similar to the “theory of the empty battlefield” posed in an article written by Dr. James Schneider, instructor at the School of Advanced Military Studies,<sup>25</sup> suggesting that the increased lethality of weapon systems will lead to an increase in the dispersion on the battlefield that will in turn challenge logisticians to support an ever-increasing amount of battle space comprised of fewer soldiers; (2) the continuing compression of reaction times during operations (the increases in tempo and the

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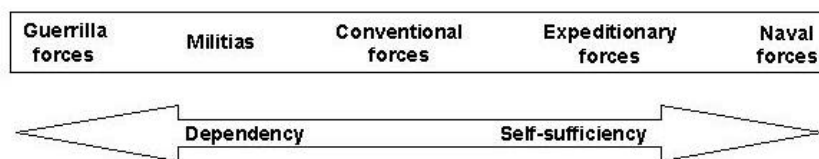
<sup>24</sup> Ibid., 39.

<sup>25</sup> Dr. James Schneider, “The Theory of the Empty Battlefield,” *Journal of Royal United Services Institute* (September 1987): 37-42.

dynamic nature of the environment that negates plans and challenges the responsiveness of logisticians); (3) the trend of US forces to carry out a wider variety of missions beyond the traditional definitions of war or combat (the operations referred to are security and support operations addressed in FM 3-0--the challenge of supporting the local populace while supporting combat units utilizing a force structure that was “right sized” to merely support the forces); (4) the expanded use of advanced technology (an interesting supposition that fewer more-lethal systems lead to a greater proportional loss in overall combat power for each malfunction); and (5) the ever-increasing integration of military logistics with the commercial world (while many logistical concepts are integrated into the military, there are negative implications of relying on commercial sources to provide critical functions for the military. Strategic mobility suffers if it is overly reliant on commercial sources. It will also be more difficult to retain a technological edge over opponents as the Army becomes more reliant on industry to develop military capabilities).

The most interesting portion of chapter two is the discussion of basing options in providing support. The Marine Corps divides them into permanent basing (US or fixed locations in an ally’s territory), pre-positioning, seabasing, and forward basing. An extensive effort is being made in improving the effectiveness of seabasing in order to capitalize on the mobility and security of operating from off shore (a further discussion of this will be presented in chapter 4, “Developing Concepts.” Currently they warn of the vulnerability and limitations with today’s assets, but point to the great potential with improvements in amphibious shipping, aircraft, landing craft, communications, and information technology. The presentation of the tension associated with forward basing is directly applicable to the Army. The need for security to efficiently employ manpower to perform the support mission tends to favor greater distance from the combat units, but this directly affects the responsiveness afforded by basing further forward. Both services rely on a combination of basing options to sustain operations. The chapter finishes with a discussion of approaches to logistics ranging from dependency to self-sufficiency (figure 3). It asserts that, “The vast majority of military units are designed to fight within their own

countries or on the territory of and immediate neighbor,” further stating that forces do not expect to fight far from their permanent bases.<sup>26</sup> This is essentially the difference that distinguishes the Marine Corps force structure and the Army’s.



**Figure 3. Approaches to logistics**

The final chapter, “Creating Effective Logistics,” nests MCDP 4 with MCDP 1, *Warfighting*. This is important as it links the logistics operations to the type of warfare that the Marine Corps will pursue. It begins with a discussion of the operational design, whereby the enemy’s centers of gravity will be undermined by the exploitation of his critical vulnerabilities. The challenge for logisticians is to ensure there is sufficient resources to provide the *reach* required to defeat the enemy while not presenting a critical vulnerability that the enemy can exploit. This concept is in line with the discussion of basing options in the previous chapter and provides more rationale for the Marine Corps effort to minimize the logistics footprint in theater.

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<sup>26</sup>Commandant of the Marine Corps, 76.

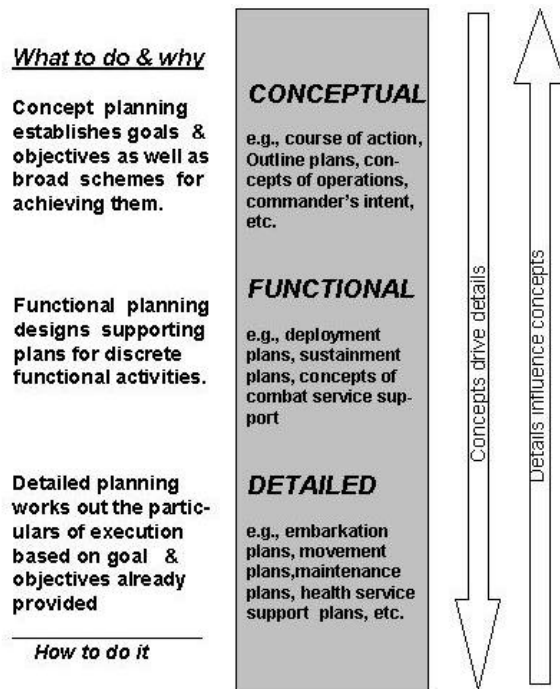


In order to succeed with this smaller footprint, overspecialization is discouraged as it does not support the high tempo required to execute maneuver warfare. The Marine Corps focus on expeditionary, maneuver warfare influences its force design as evidenced by the statement in this chapter, “The force must be built with deployment and sustainment in mind.” Indeed, the majority of the ground systems employed by the Marine Corps reflects this philosophy. This is significantly different from the focus on lethality and survivability that drove the Army to develop the big five, yet The Marine Corps has adopted one of these systems (the M1A1 Abrams). The robust logistical requirements of the M1A1 appear to adversely affect the Marine Corps’ ability to rapidly deploy and sustain operations. In fact M1A1 required “500 Marine logistics specialists working around the clock” in Kuwait to unload, repair, and assemble the equipment required to support the 17,000 Marines of the 1st Marine Division for a month-long operation.<sup>27</sup>

The last portion of this chapter that differs from Army doctrine is the inclusion of the useful planning hierarchy model that originates in MCDP 5, *Planning*. The fact that the same model is used throughout all Marine Corps planning helps to ensure a common framework is used for operations as well as logistics. This “hierarchical continuum” presents the conceptual planning (the “what and why”) as the art and the detailed planning (the “how”) as the science (figure 4). It reinforces the overall theme of the publication that logistics is a complex system of systems with all of its variables interrelated and they cannot be planned in isolation.

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<sup>27</sup> Jonathan Finer, “Marines Are on the Front Line, And Now So Is Their Equipment,” *The Washington Post*, 29 January 2003, A01.



**Figure 4. Planning Model**

#### **MCWP 4-1, *Logistics Operations***

MCDP 4 translates the philosophy established in MCDP 4 and relates it to Marine Corps specific logistical missions. Its first chapter establishes the logistical self-sufficiency of the Marine air-ground task force (MAGTF) for up to sixty days as an essential element of its expeditionary war-fighting capability.<sup>28</sup> This, of course, is to be accomplished in conjunction with the Navy while external supply channels are established. The first chapter states that its logistics core capabilities are what distinguish a MAGTF from other military organizations, but the capabilities are essential to any force that intends to project power and therefore not unique to the Marine Corps. In fact these functions all appear in current Army doctrine (figure 5).

<sup>28</sup> Commandant of the Marine Corps, MCWP 4-1, *Logistics Operations* (Washington, DC: Government Printing Office, April 1999), 4-1.

# Logistics Core Capabilities

- **Distribution Systems**
  - Bases
  - Resources
  - Procedures
- **Command & Control**
  - People
  - Information
  - Systems

**Figure 5. Core Capabilities**

Other than some minor deviations in combat service support characteristics (they do not have “integration” as an eighth characteristic) and functions (they do not include band support as a CSS function) the regulation is essentially the same as chapter 12, “Combat Service Support,” of FM 3-0. The first indication of the differences between Marine Corps and Army maintenance operations is expressed in the first chapter as it gives a brief overview of the different functional areas (see table 1). The fact that there are five echelons of maintenance makes it appear that the structure is different than that of the Army’s. In fact they are nearly identical to the maintenance process followed in the Army. The first echelon corresponds to the Army operator maintenance (essentially PMCS or -10 level maintenance). The second echelon is equivalent to organizational (-20) level repairs. The third echelon is comparable to direct support (-30) level repairs. The fourth echelon, which encompasses component repair, serves the same function as Army GS maintenance. The fifth echelon is depot maintenance, the same as in the Army. The technical

manuals indicate the echelon of maintenance that is authorized to perform the needed repair.

Therefore there is no significant difference in the functions that are performed in the two services, merely where they are performed.

<b>Table 1. Levels and Echelons of Ground Equipment Maintenance.</b>	
<b>Levels of Maintenance</b>	<b>Echelons of Maintenance*</b>
<b>Organizational</b> -Authorized at performed by, and the responsibility of the using unit. Consists of cleaning, servicing, inspecting, lubricating, adjusting, and minor repair.	<b>First</b> -Limited action performed by crew or operator as prescribed by applicable manuals.  <b>Second</b> -Limited action above the operator level performed by specialist personnel in the using unit
<b>Intermediate</b> -Performed by designated agencies in support of the using unit or for certain items of equipment by specially authorized using units. Includes repair of subassemblies, assemblies, and major end items for return to lower echelons or to supply channels	<b>Third</b> - Component replacement usually performed by specially-trained personnel in owning or CSS units.  <b>Fourth</b> -Component and end item overhaul and rebuilding performed by CSS units at semi permanent or fixed sites.
<b>Depot</b> -Major overhaul and complete rebuilding of parts, subassemblies, assemblies and end items	<b>Fifth</b> -End Item overhaul and rebuilding performed by industrial-type activities using production line techniques, programs, and schedules.
*Equipment technical manuals and stock lists specify echelon of repair for each item.	

#### **MCWP 4-24, *Maintenance Operation***

As stated earlier, maintenance operations within the Marine Corps are similar to that employed by the Army and depicted in FM 4-30.3, *Maintenance Operations and Procedures*. There are differences in terminology and methodology, but essentially, all of the same procedures occur. Typically the Marine Corps consolidates its maintenance operations in the Force Service Support Groups (FSSG) while they are not deployed in order to take advantage of scale. The FSSG is a permanently structured command designed to support the entire Marine Expeditionary Force (MEF). When a MAGTF is formed, the FSSG task-organizes into a Combat Service Support Element (CSSE) to meet the size of the MAGTF and the mission. The smallest CSSE

supports a Marine Expeditionary Unit (MEU) Service Support Group (MSSG). It may contain assets from the division as well as the FSSG and conducts maintenance from a single force combat service support area (FCSSA). The FCSSA is generally located near a beach, seaport, or airfield and provides all six functional areas of combat service support. Combat Service Support Detachments (CSSD) are task-organized primarily to rearm and refuel with limited maintenance or supply capability. They normally establish repair and replenishment points to support mechanized or rapidly moving units. These points can be as far forward as the supported unit trains, but are temporary and driven by necessity.<sup>29</sup> Mobile CSSDs pose sufficient mobility assets to keep pace with the supported element with a limited ability to perform maintenance in forward areas.

The FSSG has one maintenance battalion composed of a headquarters, four commodity companies, and a general support maintenance company (see figure 6). The maintenance battalion forms platoon detachments from each of its four functional companies to provide intermediate level ground maintenance (all second and third echelon and limited fourth echelon) that exceeds the unit's organic capability. Onboard maintenance is then performed by maintenance contact teams (made up by the organizational maintenance personnel from the supported unit) or by maintenance support teams from the CSSE. Again this differs little from Army maintenance practices.

## Terminology Differences

Table 1. Differences in Terminology	
Marine Corps Term	Army Equivalent Term
Equipment Repair Order Shopping List (EROSL)	Job Order
Marine Corps Ground Equipment Resource Reporting (MCGERR), MCO 3000.11	Army Regulation 220-1 <i>Logistics Readiness and Sustainability</i>
Marine Integrated Maintenance	The Army Maintenance Management

<sup>29</sup> Commandant of the Marine Corps, MCWP 4-24, *Maintenance Operations* (Washington, DC: Government Printing Office, April 1998), 4-3.

Management System (MIMMS)	System (TAMMIS)
Marine Corps Bulletin (MCBul) 3000	Master Maintenance Data File (MMDF)
Piece/parts	Component parts
Secondary reparables (secreps)	General Support reparables (GS reps)
Selective interchange	Controlled exchange
Supported Activities Supply System (SASSY)	Supply Support Activity (SSA)

## Methodology Differences

In general the Marine Corps force service support groups are configured in much the same fashion as rear corps support groups in the Army. They use functional based units to task organize for the mission, maintaining the flexibility in their structure to embed logistic units in a deploying unit. The actual procedures for conducting and tracking maintenance are nearly identical to Army maintenance procedures. The maintenance processes are divided into four phases, acceptance of equipment, induction, active maintenance, and close out. The requirements are documented in accordance with Marine Integrated Maintenance Management System (MIMMS). Instead of using a Department of the Army Form 5507, jobs are opened with a Equipment Repair Order Shopping List (EROSL) with all of the associated repair parts annotated. A difference in supply procedures does develop when a MAGTF is established for deployment. By embedding maintenance echelons one through four into the deploying unit reduces the echelonment of supplies as only one Supported Activities Supply System (SASSY) supports them. The fourth echelon of maintenance (normally associated with semifixed or permanent shops and generally has a commodity-peculiar mission) performs the same mission as Army GS maintenance units. The difference is their fourth echelon of maintenance operates on a repair and return basis to the SASSY, rather than to the wholesale supply system. Therefore, if the Marine Corps were to operate in a theater with Army forces only, Army reparables would be returned to theater stockage.

The Marine Corps is much more restrictive in their doctrine for selective interchange (controlled substitution) and cannibalization. Selective interchange is authorized only when an “operational commitment” is imminent rather than to support unit readiness as stated in FM 4-30.3. Approval for cannibalization is retained at HQMC level. Following these guidelines would improve mechanic man-hour utilization and increase the visibility of supply shortcomings.

The Marine Corps does not have an automated Material Master Data File (MMDF) incorporated in their MIMMS. Reportable items are listed in MCBul 3000 for reporting readiness as required by Marine Corps Ground Equipment Resource Reporting (MCGERR). The reporting requirements are much the same as in the Army with pacing items capable of driving their readiness rates. The field maintenance subsystem for MIMMS produces management reports similar in nature to the Army Standard Automated Maintenance System (SAMS). The daily process report is used to manage organizational maintenance, while the Weekly Owning Unit Maintenance TAM Report serves the same purpose as a SAMS 026 report.

In practice the Marine Corps appears to be going away from the five-echelon approach to maintenance and refining what is performed at each of the three levels. MCWP4-24 indicates the blurring of these lines as it states, “Some elements of third and fourth echelon maintenance can be performed at either the intermediate or organizational levels dependant on the capability assigned in the T/O [task organization] mission statement of certain commodity-peculiar organizations (e.g., tank battalion, communications battalion, light armored reconnaissance battalion).”<sup>30</sup> This appears to be the same as Direct Support Plus (DS+) or Direct Support Electronics Test System (DSETS) repair of line replaceable units performed by Army maintainers. The Center for Naval Analyses conducted a study in August of 1999 proposing several options for migrating away from the five echelons of maintenance. As part of this study, it was learned that in practice the third

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<sup>30</sup>Ibid., 1-4.

and fourth echelons of maintenance are already consolidated.<sup>31</sup> In essence they are practicing maintenance in the same manner as Army units that have not converted to the Force XXI concept. The study proposes further changes that would be in line with the “two levels of maintenance” concept that the Army is pursuing. Details of the proposed changes will be covered in chapter 3, “Developing Concepts.”

## Organization

The organizational structure of Marine Corps units differs greatly than that of the Army. The MAGTF is the principal organization for all missions across the range of military operations. The MAGTF is a modular structure comprised of an Aviation Combat Element (ACE), Ground Combat Element (GCE), and a Combat Service Support Elements (CSSE). The principal fighting organization is the MEF, particularly for larger crises of contingencies (see figure 7). There are three standing MEFs, comprised of a permanent command element and one Marine division, Marine aircraft wing, and a force service support group (FSSG).<sup>32</sup> The force structure of each MEF varies but follows the basic structure with a Headquarters Group, Air Wing, Marine Division, and a FSSG. The First MEF is comprised of 44,496 personnel (41,560 Marines and 2,936 Sailors). The Second MEF has 45,674 personnel (42,966 Marines and 2,708 Sailors) while the Third MEF has 20,770 (19,141 Marines and 1,629 Sailors). The maintenance significant ground equipment consists of 58 M1A1s, 72 M198 Howitzers, 122-207 LAVs (with Second MEF only having 122), approximately 1,250 5-tons, 2,600 HMMWV, and between 291 to 334 LVSs (similar to a HEMMT cargo)<sup>33</sup>. The CSS structure supporting these organizations also varies with 19.3 percent of the force structure in the First MEF, 19.6 percent for the Second MEF, and

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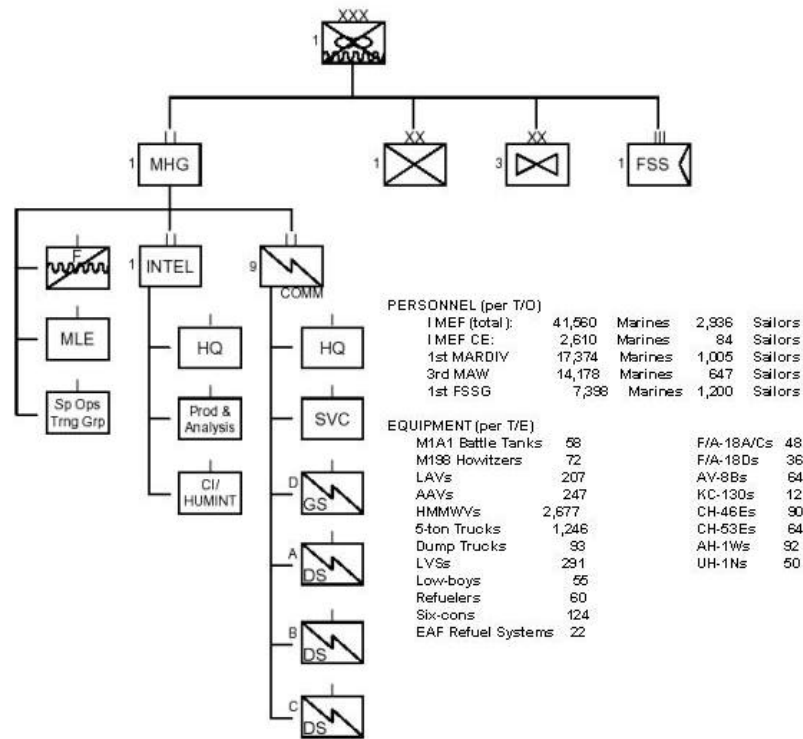
<sup>31</sup>James North and Kim Deal, *Three Versus Five Echelons of Maintenance* (Alexandria, VA: Center for Naval Analyses, August 1999), 13.

<sup>32</sup>Commandant of the Marine Corps, MCDP 3, *Expeditionary Operations* (Washington, DC: Government Printing Office, April 1998), 69-73.

<sup>33</sup>Commandant of the Marine Corps, MSTP Pamphlet 5-0.3, *MAGTF Planner's Reference Manual* (Washington, DC: Government Printing Office, April 2001), 5-12.

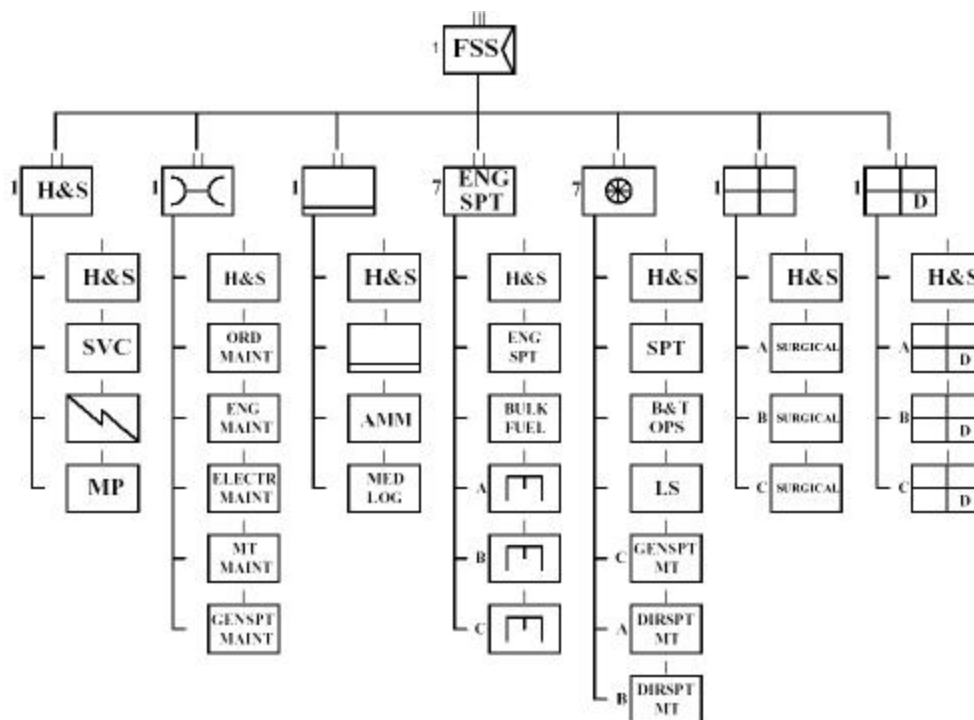


24.3 percent of the Third MEF. The FSSG contains as many as 8,600 personnel organized along functional lines, configured similarly to an Army rear corps support group. They task organize to support the deploying force, providing maintenance support teams in much the same fashion as units that have not transitioned to the Force XXI concept (see figure 8). MEFs typically deploy by echelon with sixty days of sustainment.<sup>34</sup>



**Figure 7. I Marine Expeditionary Force Organization**

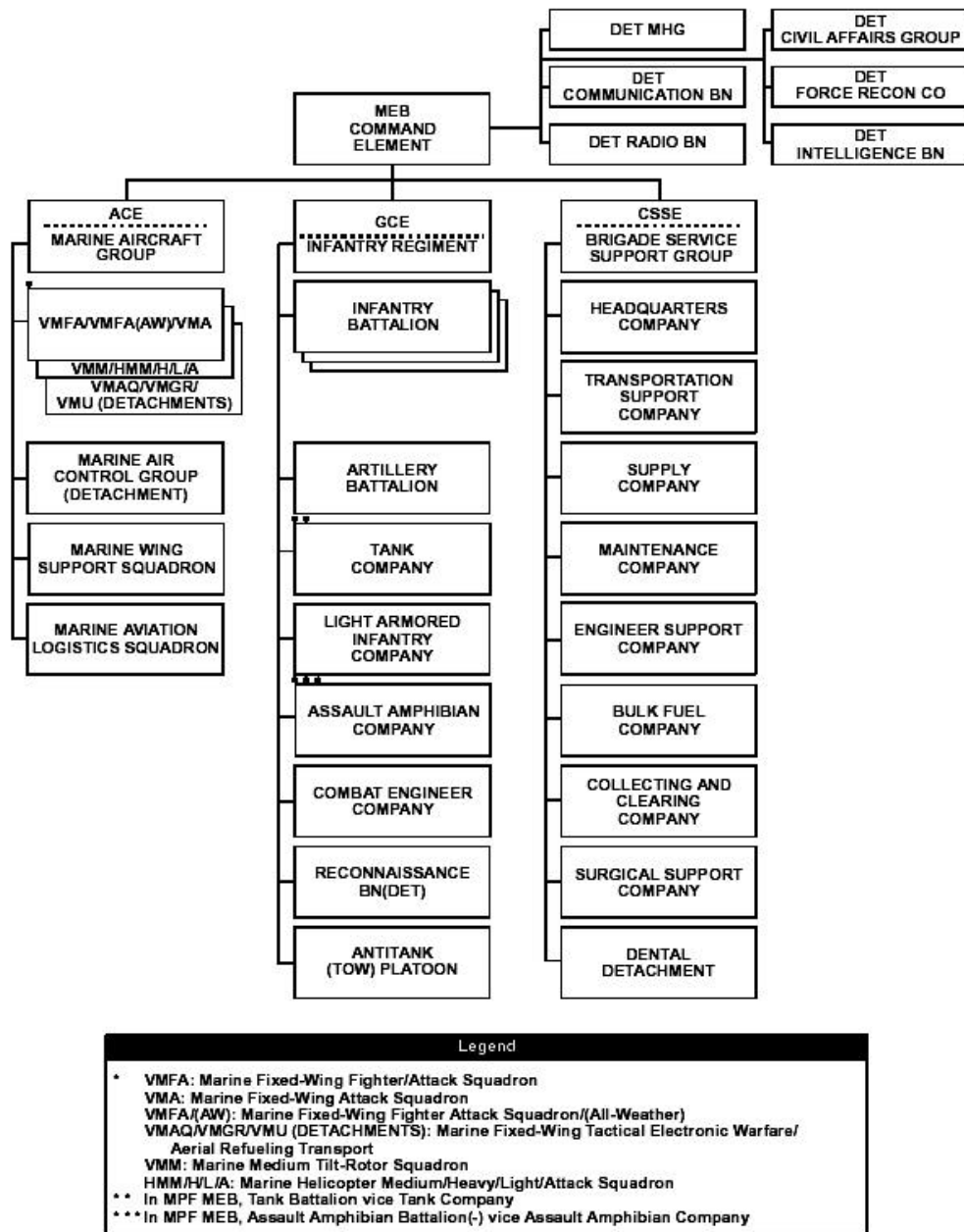
<sup>34</sup>US Army Command and General Staff College, Student Text 100-3, *Battle Book* (Fort Leavenworth, KS: US Army Command and General Staff College, 1 July 2001), 13-7.



**Figure 8. Forward Service Support Group Organization**

The Marine Expeditionary Brigade (MEB) is a mid-sized MAGTF with approximately 16,000 personnel capable of amphibious assault operations and maritime pre-position force (MPF) operations. It is task organized with a brigade service support group (BSSG) and deploys with thirty days of supplies for sustained operations. The MEB can operate independently or as the lead element for a MEF.<sup>35</sup> The MEB is task organized like an Army light Infantry Brigade combat team reinforced with a company of tanks, a company of light-armored vehicle (LAV) equipped Infantry Company, a Reconnaissance detachment, and an Aircraft group (see figure 9).

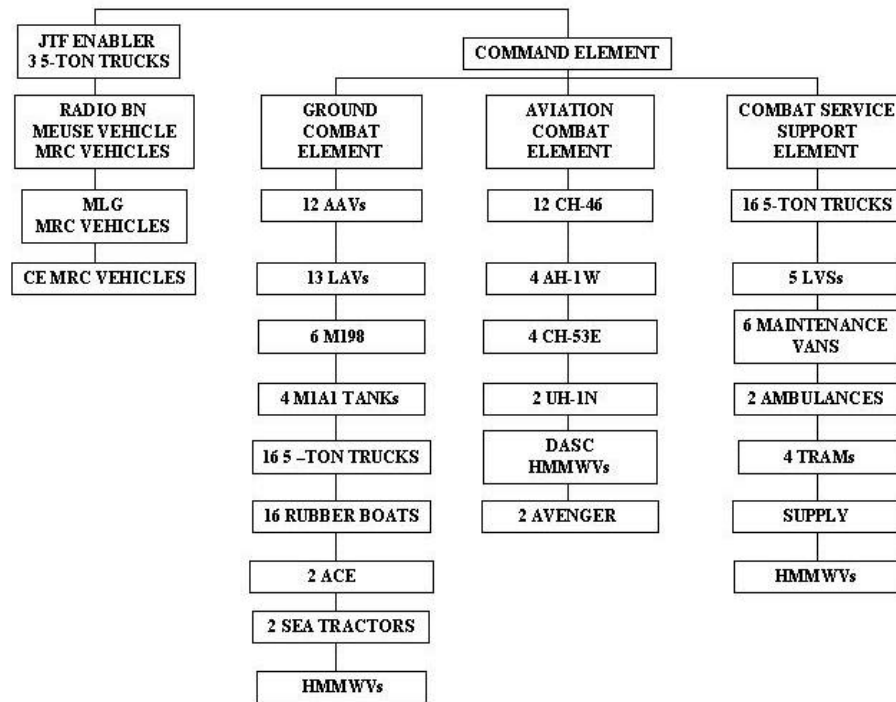
<sup>35</sup>Ibid., 13-8.



**Figure 9. Marine Expeditionary Brigade Organization**

The Marine Expeditionary Unit (MEU) is a MAGTF configured to be forward deployed to rapidly respond to contingencies. It is comprised of approximately 2,500 personnel and retains

the functionality of a combined arms team complete with a CSSE. The structure is tailored to the potential missions that it may encounter as well as the availability of shipping space. The number of ground systems approach the density found in an Army mechanized battalion and can include M1A1 tanks (see figure 10).



**Figure 10. Notional Marine Expeditionary Unit**

## Training

The Marine Corps has an excellent training program for mechanics. There are a great number of similarities between its program and the Army's. In fact the Army and Marine Corps jointly train in what is referred to as Interservice Training Review Organization (ITRO) with identical training. There are several cases where the two services train together, such as basic metal workers (MOS 45B or 1316), machinist (44E or 2161), small arms repairer (45B or 2111),

and tank systems technician (45K or 2171). The M1A1 Tank System Mechanic's Course for the Marine Corps (MOS 2146) is taught at Fort Knox and is approximately 90 days long.<sup>36</sup> Though this training is not conducted in conjunction with the Army personnel it is similar to what they were taught prior to converting to the multicapable mechanic concept (MOS 63A). With this change the Army course now is sixteen weeks and two days' long. Training jointly makes a great deal of sense since at the mechanic level the procedures followed are essentially the same and much of the equipment is common to the two services.

### ***Pre-positioning***

The Marine Corps' pre-positioning program is more effective than the Army's. Both forces utilize pre-positioned equipment to respond to crisis situations throughout the world; they differ in several ways. The Army maintains two brigade (a 2X2 BDE and a 1X1 BDE) sets on ships with the remainder of the thirty-one heavy battalion sets are located in Europe, the Middle East, and Korea.<sup>37</sup> The Marine Corps maintains three Maritime Pre-positioning Ships (MPS) Squadrons, each capable of sustaining 17,000 Marine Corps Air Ground Task Force personnel for thirty days.<sup>38</sup> The Army's sustainment stocks are maintained in a separate location.

The Army's experience with the pre-positioned fleet at the National Training Center (NTC) is indicative of the challenges facing this concept. Increasingly units rotating through NTC transport their own equipment to Fort Irwin rather than drawing the pre-positioned set because it does not match the equipment that they routinely train with. The fleet modernization

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<sup>36</sup>Combined Arms Support Command, M1A1 Tank System Mechanic's Course Program of Instruction, 30 January 2003.

<sup>37</sup>Global Security.org, Army Prepositioned Stock (APS), [ex-Army War Reserve (AWR)] available from <http://www.globalsecurity.org/military/agency/army/aps.htm>, Internet, accessed on 22 January 2003

<sup>38</sup>Asia-Pacific Defense FORUM Staff, "The Maritime Prepositioning Force and the US Marines" Asia Pacific Defense FORUM Magazine, Spring 1999, 13 available from <http://forum.apan-info.net/spring99/mpf1.html>, Internet accessed on 22 January 2003.

programs are incremental and have led to a wide variation in equipment at the various units. For example the in FY 2002 the 1st Cavalry Division and 3rd Armored Cavalry Regiment had M1A2 Abrams and M2A2/M3A2 Bradleys, while the 4ID had a mixture of M1A1D, M1A2 SEP, M2A2ODS, and M2A3/M3A3. Only the 1AD, 1ID, 2ID, and 3ID had M1A1 Abrams and M2A2 ODS, compatible with the pre-positioned fleets at Fort Irwin or throughout the Army pre-positioned stocks (APSs). As the Army stands up the Stryker Brigades this issue will be further exacerbated. The USMC has less variation in its force structure and is less challenged with the pre-positioned concept. Each of the Maritime Pre-positioning Force (MPF) is configured to support a particular MEF, whereas the APS is set for generic units--not designed for any particular unit and inevitably lags in force modernization. The 2nd Brigade of the 1st CAV was required to "train down" when it recently deployed to Kuwait and drew the best set in the APS inventory.<sup>39</sup> The 1st CAV had M1A2s and signed for M1A1s as part of the APS. The 1st CAV has since fielded the M1A2 SEP further distancing themselves from the APS stocks.

Pre-positioned equipment allows for more rapid force projection, but it has some inherent problems associated with its use. For example the Marine Corps experienced a lower OR rate (as low as 76 percent at one point, with 93 percent the average) for its afloat LAVs than its ground based LAVs.<sup>40</sup> Equipment cannot be exercised while it is on the ship or in storage; this routinely leads to problems with hydraulics, breaks, seals, as well as flat spots on radial tires. The repair parts that are supposed to sustain the equipment are normally insufficient. The Class IX block that accompanied the MPF equipment for Operations Desert Shield and Storm did not match the needs. Of the 18,000 line items aboard the ships only 800 matched the needs in theater. Conversely, there were ten or more requisitions for some 3,000 lines that were not in the MPF

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<sup>39</sup>I served in the Army Materiel Command and was involved in the APS program until July 1997. The fleet in Kuwait retained the highest readiness rate for equipment on hand as well as serviceability.

<sup>40</sup>U.S. Department of Defense, *Conduct of the Gulf War: Final report to Congress* (Washington, DC: Government Printing Office, 1992), 829.

inventory.<sup>41</sup> The Defense Logistics Agency generates the demand analysis that drives the Class IX stockage for the APS fleet. Since the analysis is so far removed from the unit level (averaging the entire fleet) it does not provide any closer match than the Marine Corps experience during Operation Desert Storm.

### ***Repair Parts Management***

The Marine Corps and Army follow similar procedures for generating Class IX packages for deployment. The Marine Corps begins with the supported activities supply system (SASSY) Management Unit running a deployment support generator package (referred to as a genpack) which is tailored to the size of the MAGTF and the equipment that is to deploy. Using this as a base, commanders refine the Class IX block using factors, such as experience (some of this comes from lessons learned from other organizations), the projected mission, environmental considerations for the particular region, and embarkation and lift constraints. Since the Defense Logistics Agency (DLA) provides integrated materiel management and supply support for all DLA-managed commodities (including subsistence; clothing, textiles, hard copy maps, and supplies; POL; construction materiel; medical materiel; and weapon system repair parts);<sup>42</sup> the criteria underlying stockage levels are essentially the same. Since the Marine Corps uses one SASSY to support the Class IX is centrally located and tailored for the mission. There is no indication that the Marine Corps maintain a separate bench stock or shop stock as part of its normal operation.

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<sup>41</sup>Government Accounting Office, Report to the Chairman, Subcommittee on Oversight of Government Management, Committee on Governmental Affairs, U.S. Senate, DESERT SHIELD/STORM LOGISTICS, November 1991, 26.

<sup>42</sup>Chairman of the Joint Chiefs of Staff, JP 4-0, *Doctrine for Logistics Support of Joint Operations* (Washington, D.C: Government Printing Office, A-3.

## **CHAPTER 3**

### **DEVELOPING CONCEPTS**

The Marine Corps and the Army are both pursuing change to improve the sustainment of their respective forces. This process is being driven by the *Joint Vision 2010* and *Joint Vision 2020* with extensive emphasis being placed on improving logistics and improving Joint interoperability. The guidance provided in the *Joint Vision 2020* is driving innovation within the both services and manifesting itself in some unique innovations and will likely drive changes in doctrine and repair parts management.

#### **Joint Logistics Vision**

*Joint Vision 2010* introduced the term “focused logistics” and defines it as the ability to provide the right personnel, equipment, and supplies in the right place, time, and quantity across the range of military operations. The focus is on instilling confidence in the war fighter that critical supplies will be in the right place, at the right time, and in the right quantity. The goal is to have the logistics footprint of the future be a more precise balance between “just in case” and “just in time” to achieve “just enough.”<sup>43</sup> The tenets of focused logistics are: joint deployment/rapid distribution, information fusion, joint theater logistics command and control, multinational logistics, joint health services support, and agile infrastructure. The initiatives initiated in during *Joint Vision 2010* continue within *Joint Vision 2020* and have direct implications for the Marine Corps and the Army.

#### **Joint Deployment/Rapid Distribution**

The tenet that has an immediate impact on maintenance operations for both services is joint deployment and rapid distribution. This initiative is driving the development of joint total

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<sup>43</sup>LTG John J. Cusik and GEN John M. Shalikashvili, *Focused Logistics, A Joint Logistics Roadmap, Joint Vision 2010* (Washington, DC: Government Printing Office, not dated), ii.



asset Visibility (JTAV). JTAV will link together inprocess (items being repaired either at depot or at GS/echelon 4 maintenance), in-storage, and in-transit visibility. This is to be achieved through “instrumenting the pipeline, reducing human intervention, optimizing business processes, and inserting new/emerging technologies.”<sup>44</sup> It is a network centric approach that strives to provide users with timely and accurate information on the location, movement, status, and identity of units, personnel, equipment, and supplies.<sup>45</sup> This initiative is driving the development of Global Combat Support System (GCSS) which is designed to provide the joint forces with a single, end-to-end capability to manage and monitor units, personnel, and equipment from mobilization through deployment, employment, sustainment, redeployment, and demobilization.<sup>46</sup> GCSS (which falls under the information fusion tenet, but is essential for distribution) will replace the many different logistic automation systems that currently operate on diverse database programs utilizing different operating systems. The GCSS software is being developed to operate on any computer, providing universal access to combat service support information and eventually provide full interoperability between support functions and command and control.<sup>47</sup> It is the first step towards allowing interoperability throughout the services. With this level of visibility it will be possible to develop a more refined, efficient Theater Distribution (TD) system that can be implemented (see figure 11).

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<sup>44</sup>Joint Logistics Warfighting Initiative, Status Update, 26 June 2002. Accessed at <http://www.jlwi.org/jlwi/Documents/General/1.html>, Accessed on 8 October 2002.

<sup>45</sup>Cusik and Shalikashvili, 19.

<sup>46</sup>Director, Information Systems Agency, GCSS Executive Summary, Available from <http://www.disa.mil/gcss/execsum.html>, Accessed on 21 January 2003

<sup>47</sup>Cusik and Shalikashvili, 16.

## The Elements of Distribution

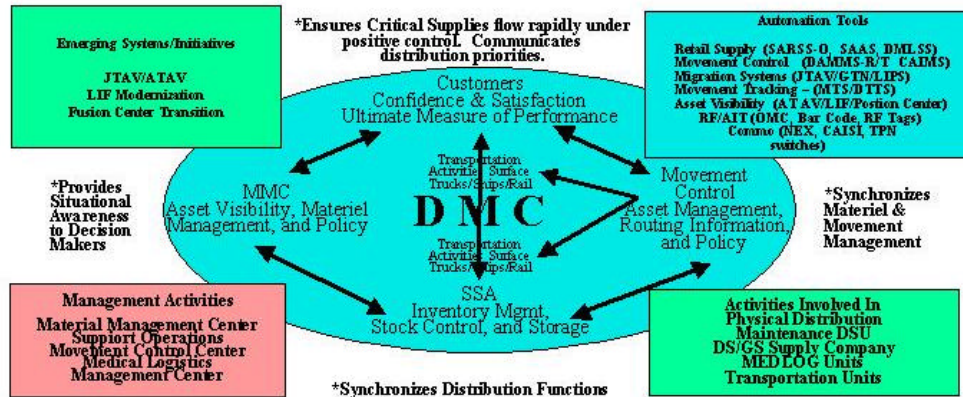


Figure 11. The Elements of Theater Distribution

During Operations Desert Shield and Desert Storm over 40,000 containers were shipped to the Middle East; and more than 20,000 of them had to be opened, inventoried, resealed, and reinserted into the transportation system. When the war finally ended, more than 8,000 containers remained to be opened.<sup>48</sup> With the visibility proposed in this concept, it will be possible to eliminate many of the inefficiencies in the distribution system that led to the creation of the “iron mountain” during Operation Desert Shield. The web-based total asset visibility system will enable users to peer into the pipeline and reduce double ordering. It will go a long way towards providing the confidence in the system and achieve just enough logistical support in theater. In March 1997, the United States Transportation Command (USTRANSCOM) implemented the Global Transportation Network (GTN) which provides in-transit visibility.<sup>49</sup> It

<sup>48</sup> Major William L. Taylor, USMC, “Joint Total Asset Visibility: Foundation of Focused Logistics,” *Army Logistician Magazine*, (May-June 2000): 3.

<sup>49</sup> Cusik and Shalikashvili, 21.

will greatly enhance the visibility of stocks while they are on strategic lift assets, but it will not provide seamless visibility until the full fielding of GCSS. The remaining modules of GCSS are not expected to be completed prior to the third quarter of fiscal year 2005.<sup>50</sup> The improvements implemented thus far would improve the Desert Shield and Storm operations, but will not eliminate double ordering.

One final initiative being pursued under the joint deployment/rapid distribution tenet is improvement in the joint logistics over-the-shore (JLOTS) capability. Currently JLOTS is only capable of delivering forces through sea state 2 (SS2-wave height 1.5 to 3.0 feet, wind 5.0 to 12.7 knots).<sup>51</sup> This severely limits the usefulness of JLOTS. The Army and Navy entered into a Memorandum of Agreement to achieve delivery through SS3 (wave height 3.5 to 5.0 feet, wind 13.7 to 16.4 knots). This would make them effective 75 percent of the time. This would allow the largest ships to discharge regardless of a port's capability, allowing for the sustainment of forces and helping to mitigate enemy antiaccess strategies.

## **Outsourcing and Privatization**

Though the DoD (Department of Defense) will not consider outsourcing, the activities associated to its core capabilities are interested in pursuing privatizing activities that result in a better value for the government.<sup>52</sup> Logistics outsourcing is being pursued to directly support in theater and incorporating continental US-based commercial sources to provide support for weapon systems. The use of prime vendor support for weapon systems is one indication DoD is changing the business practice from the "lowest bidder" concept to sustain in the future. Another initiative would reduce the requirements for maintaining secondary item war reserves by

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<sup>50</sup>Army RDT&E Budget Item Justification (R-2 Exhibit), Global Combat Support System, February 2002.

<sup>51</sup>Cusik and Shalikashvili, 10.

<sup>52</sup>Ibid., 35.

investing to guarantee industrial base response. This provides a solution for maintaining the relevancy of the Class IX associated with the pre-positioned stocks, but it would still burden the strategic lift assets to get it into theater. These initiatives have demonstrated a cost savings and will continue to be expanded in the future.

### ***Army Logistics Vision***

More than building and procuring new systems and platforms, Army Transformation combines advanced technologies, organizations, people, and processes with concepts to create new sources of military power that are more responsive, deployable, agile, versatile, lethal, survivable and sustainable.<sup>53</sup>

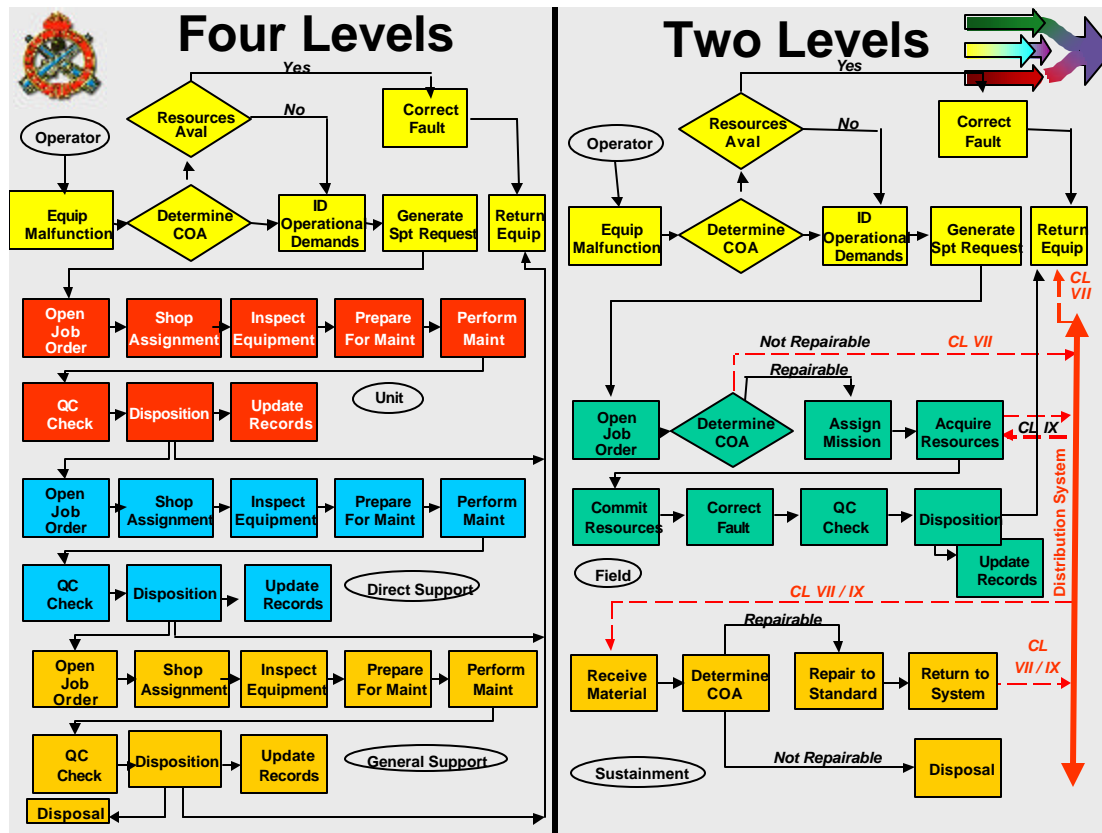
### **Two Levels of Maintenance**

The Army is transforming from its current four levels of maintenance to a two level system that reflects the contemporary environment rather than the echeloned system designed to face the Soviet threat. The current maintenance system consists of unit maintenance (performed by the operator and unit mechanics), direct support (DS) maintenance (performed by the support battalion on a repair and return basis), general support (GS) maintenance (performed by corps and theater personnel, commodity oriented for repair of components and end items for return to the supply system), and depot maintenance (performed at fixed facilities by civilian personnel for return to the wholesale supply system). The future concept is to divide maintenance into field maintenance (focused primarily on board repair, component/ module/assembly replacement) and sustainment maintenance (off system component/module/assembly repair focused on returning items to the supply system) (see figure 12). The reduction will eliminate repetitious inspections, saving time and more efficiently utilizing mechanic man-hours. This in itself will assist in

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<sup>53</sup>Erik K. Shinseki and Thomas E. White, *The Army Transformation Roadmap* (Washington, DC: Government Printing Office, Not dated), vii [document on-line]; available from [http://www.army.mil/vision/Transformation\\_Roadmap.pdf](http://www.army.mil/vision/Transformation_Roadmap.pdf); Internet; accessed on 9 October 2002.

reducing the logistics footprint in theater. Conversely it will require a more robust and responsive supply system to back it up.



**Figure 12. Two-Level Maintenance**  
**Directorate of Combat Developments--Ordnance**  
**U.S. Army Combined Arms Support Command**

The “two-level maintenance” concept will be challenged during peacetime operations as units continue to execute component repairs at unit level. The reality of budgetary pressures routinely drives units to repair rather than replace components even though their Modified Table of Organization and Equipment (MTOE) does not resource the unit to conduct these repairs. The Direct Support Plus (DS+) repair of tank engines is the most visible example of this though it

happens with many different line repairable units. Every Army post that had M1 Abrams tanks ran their own DS(+), in fact there were two DS+ operations on Fort Hood supporting the two divisions. As long as there is a perceived savings, units will continue to implement programs that are not in accordance with the force structure design. The realities of peacetime operations cannot be ignored while developing the concepts and force structure for the future force.

## **Embedded Diagnostics**

The commercial auto industry has demonstrated the benefits of designing diagnostic technology directly into the automobile. Since 1995, Ford vehicles have been built with onboard diagnostics that permit shop test equipment to isolate faults and transmits repair data to central databases. This information is used to track abnormal occurrences across the fleet and to predict parts usage.<sup>54</sup> This same technology is being applied to future Army weapon systems. It is envisioned that these onboard sensors will be linked directly to the logistics automations systems allowing for the anticipation of faults. This prognostic ability will enable logisticians to be proactive and to ensure proper diagnosis and the correct part is available prior to beginning repair. Improvements in fault isolation will not only improve the timeliness of repairs, it will also improve the accuracy of the Class IX requirements required to support the equipment.

## ***Marine Corps Logistics Vision***

The Marine Corps in conjunction with the Navy is aggressively pursuing innovations under the concept of “ship-to-objective maneuver” (STOM). This is a maneuver centric approach focused on attacking objectives from over the horizon without the need to establish beachhead operations. The Marine Corps envisions organizing its force to exploit the increased range afforded by the MV-22, the advance amphibious assault vehicle, and the landing craft air

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<sup>54</sup> Albert Hamilton, “Army Diagnostics Improvement Program,” *Army Logistician Magazine*, (January-February 1999): 96.

cushioned (LCAC) to deliver personnel, equipment, and supplies directly from the seabase or from secure bases outside the joint area of operations (JOA). This will allow the force to eliminate the “iron mountain” at the beachhead and support the Marine Corps maneuver warfare focus.<sup>55</sup> In order to support this overall philosophy of STOM, logistics innovations are being pursued in the areas of automation, seabasing with new distribution methods, and force structure changes.

## Automation

In addition to the development of GCSS that is being driven by *Joint Vision 2010 Focused Logistics*, the Marine Corps is developing the integrated logistics capability and the common logistics command and control system (CLC2S).

CLC2S will provide the MAGTF with automated logistics planning and execution tools that will complement and be interoperable with current and emerging C2 processes and systems. CLC2S will not be a separate C2 capability, but the logistics feeder to the MAGTF’s Common Operating Picture. ILC and CLC2S will combine transformational processes and information technologies to provide seamless interaction and support between the shore-based logistics units, sea-based logistics functions, maritime ISBs, and the supporting establishment enabling unencumbered maneuver ashore while the majority of sustainment capabilities remain in the seaspace.<sup>56</sup>

The goals of integrating logistics planning tools with a system to provide the logistics posture to the overall common operating picture are similar to the combat service support system (CSSCS) with the addition the maritime mission. Just as with CSSCS, CLC2S may be used to bridge the nonsecure data from GCSS with the secure realm of the tactical command and control systems that create the common operating picture.

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<sup>55</sup>Department of the Navy, *Naval Transformation Roadmap: Power and Access...From the Sea* (Washington, DC: Government Printing Office, July 2002), 15.

<sup>56</sup>*Ibid.*, 16.

## **Distribution Methods**

Sea basing capitalizes on the U.S. Navy's dominance to provide a secure, flexible, and mobile platform to provide support to the combat force. The ability to stage at sea reduces the exposure of the logistics personnel thereby reducing the force-protection requirement. With the development of higher capacity combat logistics ships the Marine Corps envisions maintaining the logistics pipeline from land-based depots and ports outside the area of operations. It also wishes to improve fleet forward munitions reload capability through improved reload systems.<sup>57</sup> The Army's use of the intermediate staging bases (ISB) is very similar though it relies on the use of a regional ally's territory to accomplish the task. Inevitably the stocks would have to be sent by ship and down loaded which increases the time and manpower for delivery. The Marine Corps recognizes that ISBs are subject to availability and disruption, due to the changing political environment, and wishes to develop an independent option. The intent is to develop an additional option and use whichever method is suitable to a particular contingency. The sea-based platforms that the Marine Corps is pursuing would allow for efficient packaging of projected sustainment stocks with the ability to adjust for unanticipated demands. They will position the ship as close to the combat zone as security permits, and MV-22 Ospreys or LCACs will deliver the supplies to the forward combat support area. Removing the need to provide perimeter security will enable logistics personnel to concentrate on sustaining the forces. By capitalizing on the communications systems capabilities of the Navy, logistics personnel will be able to rapidly communicate requirements to elements outside the JOA.

## **Force Structure**

The Marine Corps is pursuing a reduction in its maintenance structure. One proposal is to go to three echelons of maintenance vice the current five-echelon system. Increasing the

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<sup>57</sup>Ibid., 25.



responsibility of the operator to perform tasks within his limitations, consolidating the second and third echelon of maintenance, and outsourcing many of the fourth echelon repairs would accomplish this.<sup>58</sup> This would essentially lead to the same concept that the Army is pursuing with the two levels of maintenance and reinforce the initiatives articulated in “Focused Logistics” portion of *Joint Vision 2010* and *Joint Vision 2020*. It will improve the support for the higher tempo maneuver warfare envisioned in the Marine Corps’ ship-to-objective maneuver. The Marine Corps does not appear to be going to a fixed force structure akin to the Army’s, rather it will continue to tailor the support as it does today.

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<sup>58</sup>James North and Kim Deal, *Three Versus Five Echelons of Maintenance* (Alexandria, VA: Center for Naval Analyses, August 1999), 4.

## **CHAPTER 4**

### **CONCLUSION AND RECOMMENDATIONS**

There is a fundamental difference in the roles of the Marine Corps and the Army. The Army is required to conduct sustained ground operations while the Marine Corps primary mission is to perform expeditionary operations while retaining the ability to integrate into joint environment to conduct sustained combat operations. Beyond these differences the two services have a great deal of similarity as ground forces. Many of the weapon systems employed by the two forces are identical. The current Department of Defense acquisition strategy will likely increase this commonality of equipment. The doctrine of each service emphasizes offensive maneuver conducted at a rapid tempo in order to ensure the defeat or destruction of the enemy. Both services are dependant on the strategic lift provided by the Navy and Air Force in order to get into theater and conduct operations, particularly in an undeveloped theater of operation. In response to these similarities the Marine Corps and the Army have implemented nearly identical ground maintenance operations with only subtle differences. In light of this analysis the following recommendations are made in the categories of doctrine, training, organization, pre-positioning, and developing concepts.

#### **Doctrine**

The Army should adopt the Marine Corps' approach to logistical doctrine. A great deal of this paper is dedicated to examining the logical construction in Marine Corps Doctrinal Publication 4 *Logistics* (MCDP 4) through Marine Corps Warfighting Publication 4-24 *Maintenance Operations* (MCWP 4-24). Though there are very few differences in actual maintenance operations at the tactical level, there is a great difference in how they are codified throughout doctrine. It is clear that the MCWP 4-24 is nested in Marine Corps Warfighting Publication 4 *Logistics* (MCWP 4) which is subsequently nested in MCDP 4. By laying the intellectual framework for all aspects of logistics and combat service support, the Marine Corps

ensures a consistent foundation for each CSS function to build upon. The Marine Corps approach is particularly relevant as the Army pursues the Force XXI concept requiring junior lieutenants and captains to perform all aspects of combat service support well before they are trained as “multi-functional logisticians”. The fact that Field Manual 4-0 *Logistics Operations* was not the first combat service support doctrinal manual published and is only being written at this time indicates that it is not the intellectual underpinning for all CSS functions. It is more akin to the development of Joint Doctrine with each element being developed separately only to be agreed upon (by consensus) afterward. This does not result in a solid cohesive document; merely one that does not contradict its separate components. FM 4-0 should provide the foundation for all CSS functions setting the overarching principles for the Army, not a document that tries to link them together as an afterthought.

### ***Training***

Inter-service training between the Marine Corps and the Army should be the norm rather than the exception. Both services follow the guidelines outlined in Joint Vision 2020 to achieve “Focused Logistics” and are implementing many of the same concepts. Both services are pursuing initiatives to reduce the logistics footprint and reduce the levels (or echelons) of maintenance support. The Interservice Training Review Organization should identify all equipment that is common to the Marine Corps and Army for integration into the program. This would reduce duplication across the Department of Defense and support greater understanding between the forces. An introduction to Marine Corps logistics operations should be incorporated into the Combined Logistics Officer Advanced Course. The focus would be to delineate the subtle differences between Army and Marine Corps logistics. This understanding will greatly assist Army logisticians in meeting the Army’s title 10 responsibility of providing sustained ground logistics while employed in joint operations.

## ***Organization***

The Army should not adopt the Marine Corps' logistics force structure. Army units have had to tailor the force structure in order to meet the requirements for the many recent missions (i.e. Kosovo, and Bosnia) but there are advantages associated with a habitual support relationship down to battalion level. The Marine Corps structure is comparable to having all logistics organizations combined at the division level. The efficiencies garnered in peacetime operations would not offset the loss in confidence this would cause to the warfighter, a goal set out in Joint Vision 2020. Force tailoring will remain necessary but should continue from the current structure which allows for habitual relationships. The Force XXI task organization supports a relatively stable relationship at the maneuver battalion level and above and minimizes the need for creating ad-hoc organizations to meet contingency missions.

Reducing the levels of maintenance is an appropriate strategy to support high tempo operations. The Army and the Marine Corps both realize that reducing maintenance levels reduces redundant inspections and speeds the maintenance process, whether the theater has a fully developed logistics infrastructure or not. The current system requires multiple inspections and evacuations dramatically reducing the mobility of the logistics tail. The reduction of maintenance levels may not eliminate additional support areas in theater since a requirement for sustainment stocks (predominantly Class III, V and IX) but it will reduce the size of the footprint. This strategy will likely increase the requirement for delivering major end items into an area of operation and must be further analyzed to determine the impact on strategic lift assets.

## ***Pre-positioning***

The Army should revise its pre-positioning strategy to align the stored equipment to particular units. This may sound like a "retro-transformation" for the Army since the German pre-positioning of materiel configured to unit sets (POMCUS) once was designated for particular units under the Joint Strategic Campaign Plan, but it is necessary. The Marine Corps follows this

strategy and it serves them well. Each Marine Expeditionary Force ensures that the Maritime Pre-positioned Squadron is configured to support their unit. The equipment should be included in force modernization plans for the unit that it is designated for in order to ensure it is able to be employed by the unit.

In order for pre-positioning to do more than reduce the time required for strategic movement, it must be coupled with the *appropriate* sustainment stocks required to operate the equipment. The repair parts to sustain the equipment must be in line with the demands generated during a period of intense training, such as a Combat Training Center rotation (CTC). Reviews done at the Defense Logistics Agency are too far removed from the unit to effectively support the equipment. The 180-day review period at the unit level dilutes the demand by incorporating periods with little to no training. Even if the period covers a CTC rotation the equipment is idle for nearly a month as it rails too and from the site. If the equipment were designated to a particular unit, that unit would have a vested interest in verifying the adequacy of the stocks to sustain it.

### ***Developing Concepts***

Many of the innovations being pursued in both the Marine Corps and the Army are consistent with *Joint Vision 2010* and *Joint Vision 2020*. As ground forces, the two services face many of the same sustainment challenges and should work together in addressing them. The Conference of Logistics Directors process hosted by the J-4 provides the most potential for solving logistical issues for ground forces.<sup>59</sup> Many of the initiatives that the two services are pursuing are identical and should be pursued jointly. Both services are attempting to improve their logistics automations. Since they both must integrate and communicate at the joint level, it

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<sup>59</sup>Boucom, David F. Commander, USN, *The Conference of Logistics Director, Overcoming the Barriers to Logistics Transformation* (Navy Supply Corps Newsletter, March-April 2000) [document online]; available from <http://www.navsup.navy.mil/lintest/marapr2000/baucom.htm>; Internet; accessed on 2 February 2003.

makes sense to pursue a single system. The Marine Corps has focused their logistic innovations on increasing the reach of their sustainment forces in support of Ship to Objective Movement. The seabasing of logistical support is likely to support a CONUS based force projection Army.

The Marine Corps effort in the seabasing of its sustainment assets offers a flexible alternative to operating from an intermediate staging base. Developing a platform with the ability to efficiently configure and deliver sustainment stocks inland would negate the need for building bases in the area of operation. Seabasing would allow a unit projected from CONUS to more rapidly deploy into an area of operation by decreasing the requirements at the port. It would also support a unit's ability to conduct non-linear, non-contiguous fight as they would not require their lines of communication be tied to the port. Configured correctly it would provide the facilities to conduct sustainment maintenance and support the two level maintenance concept. Unfortunately, the full realization of these benefits will not be achieved with today's heavy systems but it would improve efficiency. Increasing the shipping fleet would be expensive in both initial acquisition cost and maintenance but some of these expenses would be offset by the efficiencies gained with the reduction of double handling and the reduction of storage locations.

### ***Summary***

These recommendations are aimed at improving the operational reach of Army ground forces through a systematic study of one of the influencing factors, maintenance of combat power. They are not all inclusive and they are not envisioned to radically improve operational reach in and of themselves. Instead, these recommendations are provided to improve one of the many subsystems involved in a very complex military system. General Shinseki's vision for transforming the Army into a rapidly deployable, survivable, and sustainable force may eventually negate the challenges addressed in this monograph. Until that time it is necessary to continue to refine our sustainment strategies in order to achieve our national objectives. In his book *Strategy*, Aleksandr Andreevich Svechin wrote "The art of war, in the broad sense,

encompasses all aspects of the military profession, including... studying of military administration, which analyzes aspects of the organization of armed forces, their administration and logistics, and finally studying of the conduct of military operations'<sup>60</sup> Svechen's sound guidance advocates studying the armed forces of other countries in order to improve. The US Marine Corps was the best force to study as they have addressed the challenge of strategically projecting a force globally. Their doctrine has focused on expeditionary operations, addressing the challenges associated with an undeveloped sustainment infrastructure. At this time no other nation appears to have the capability to globally project and sustain a mechanized ground force equivalent to a Marine Expeditionary Force. The Marine Corps and the Army should continue to work in unison to improve the nations ability to project and sustain ground combat forces.

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<sup>60</sup> Aleksandr A. Svechin, *Strategy* (Minneapolis, Minnesota: East View Publications, 1992) 67.

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